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THE PHOTOGRAPHIC SCHEME OF THE BODLEIAN LIBRARY.

BY JULIUS F. SACHSE.

WITHIN the last few months renewed attention has been called to the use of photography in the large libraries. All students know the great importance of having valuable manuscripts duplicated photographically. The same applies to important pages of books, rare engravings, portraits, plans, and legal documents, which by reason of their value, age, or deterioration of texture or fading of the inscription, can he handled or examined only with the greatest care, under the direct supervision of the custodian in charge.

The latest effort in this direction appears to have been made by the management of the Bodleian Library at Oxford England, in connection with the University Press. This scheme has been heralded in the daily press far and wide, in this country as well as in England, as a solution of the problem and placing the means within reach of all. But while we agree that it is difficult to estimate the extent to which the usefulness of a library *might* be increased by such arrangements, we cannot refrain from saying that the whole matter as quoted is misleading and impracticable, to say the least, at the ridiculous rates mentioned. Further, the broadcast publication of the matter in the present shape is an injustice and a direct injury to such photographers who make a specialty of that branch of photography, which often requires the highest intelligence in addition to their skill as photographers.

We cannot but think that the parties who formulated the schedule of prices have had but little or no practical experience, either in the line of the average run of library-copying, or in practical photography. We quote the original notice as issued, viz.:

"The controller of the University Press, Oxford, is prepared to take photographic negatives from MSS., printed books, etc., belonging to the library or deposited there, and to supply prints, at the following rates, permission having been first obtained from the librarian:

	S.	D.		$	CTS.
For a 10″x8″ negative taken at the library,	3.	0.	=	0.	.72
For a silver print (unmounted) from a 8″x10″ negative,	0.	4.	=	0.	8.
For a platinotype print from a 10″x8″ negative,	0.	10.	=	0.	20.
(With regard to platinotype prints, the price must vary with cost of the special paper. It will probably increase from time to time.)					
For a carbon print from a 10″x8″ negative,	0.	10.	=	0.	20.
For 20 collotype prints, with clean margins, from one 10″x8″ negative,	5.	6.	=	1.	32.
For 50 collotype prints, with clean margins, from one 10″x8″ negative,	9.	0.	=	2.	16.
For 100 collotype prints, with clean margins, from one 10″x8″ negative,	12.	0.	=	2.	88.

"Estimates for larger sizes or greater numbers may be had on application.

"The sums quoted above are given on the assumption that only *ordinary trouble will be involved* in making the negatives and prints."

If we mistake not, the price for a photographic copy of an ordinary subject in the British Museum and other libraries in England has heretofore been a guinea. In this country the average price has been $5.00,—a price which to an outsider at first would seem high, but, as will be found in actual practice, it will not pay any competent man to undertake the work for a much less sum.

The writer has probably had as great and varied experience

in this line of photography as any one in this section of the country, consequently can speak from experience. Firstly, the work has to be done in the library building, where there are no special provisions for photography, the apparatus having to be sent to the library for the purpose.

Secondly, on account of the great difference in the character of the subjects, often varying from, say the title of a 24mo missal to a map 6x8 feet, a different apparatus has to be improvised for almost every exposure.

Thirdly, as to the MSS., they require the most careful handling. The parchment is often discolored, and the ink so faded that it is almost impossible to obtain any result suitable for reproduction, the color values of parchment and writing being almost equal. Then, again, the light is usually a side light, more or less dim, for which allowance must be made. Then as there are no facilities in the library for development or testing the plates, from two to six plates have often to be exposed on the same subjects in different times, to insure at least one perfect plate and prevent the necessity of going over the same ground.

With oil paintings, usually old, cracked, and discolored, the difficulties are still greater. Assistance is often needed to take down and place into position. Then again, under the peculiar circumstances, it is often necessary to expose through a color filter, thus lengthening the time of exposure from minutes to hours.

The handling of old books,—frequently priceless gems,—brittle with age and shaky in their bindings, requires the greatest care, and are not to be trusted to any one with impunity, to truss up in front of a camera.

All these little matters mentioned above occur in actual practice. Each subject, it will be found, requires the most careful study and manipulation, which often necessitates a loss of valuable time. In addition, this work requires a degree of judgment and skill which unfortunately is not to be found in the composition of every button-presser or amateur professional who would count himself capable for this branch of photography.

While at first glance it would seem to be the easiest matter to photograph the page of a book, the tyro, if he make the attempt with the usual apparatus at the disposal of the average photogra-

pher, will soon find that to get the page square upon the plate and properly lit is not near so easy as it seems, when we look upon a finished print made by an expert.

It is to be assumed that the authorities in charge of the Bodleian Library have made every provision for development and ordinary copying, securing the best and latest apparatus; but even then they will find that there are many difficulties to be overcome in the practical working of the scheme, not the least of which will be to obtain talent of the order requisite to produce results which will satisfy the patrons of the photographic department, without injury or detriment to the property of the library or museum. Talent of this calibre costs money, and even without taking into consideration the uncertain demand and the usual delays from bad weather, which all causes loss, we doubt if they can make the departure a paying success at the formulated rates, unless the management stoop to the questionable plan of assuming that every negative "involves more than ordinary trouble," and then charge accordingly.

We have on frequent occasions pointed out the uses of the camera in the future, especially in connection with literary, historical, and scientific work.

At the same time, in view of these great possibilities, it should be the object of all liberal institutions to uphold the dignity of the art, and not to cheapen or drag it down to the level of the competitive shopkeeping of the present day. Nor should photography ever be used as a means to interfere with the livelihood of others, or to cheapen honest labor.

Every laborer is worthy of his hire,—a maxim which applies to intelligent as well as manual labor. Further, the class of persons who at the present day want photographic reproductions are perfectly able, even if not always willing, to pay for the work.

Without wishing to be understood as advocating a standard of a half eagle for all work, we trust that the heads of the great institution in question will reconsider their hasty schedule, and replace it with one commensurate with the skill and trouble involved, and which will be fair, honest, and just to the photographic craft at large, as well as to the persons who are able to indulge in photographic reproductions.

SOME MECHANICAL TROUBLES IN PHOTOGRAPHY.

BY ELLERSLIE WALLACE.

THE beauty of a photograph depends on its chemical perfectness; but, as all practical photographers know, this desirable quality is only obtainable when the mechanism concerned in the making of the negative is in good order.

We have frequently in these columns endeavored to give our readers clear ideas on these mechanical matters, knowing as we well do that they rank among the "littles" that help to make up the "muckle" of a good result.

Some aggravated cases of trouble from neglect of certain of these simple things having recently come under our notice, we ask attention to the following brief remarks.

Among some of the lesser annoyances that the photographer has to undergo from mechanical matters, badly cut or unevenly cut plates may be mentioned as one of the most exasperating. A sensitive plate may be accurately cut as regards its size, and yet be very inconvenient to work with. There may be either ragged edges like saw-teeth, chipped-off corners, edges beveled from faulty action of the diamond, or worst of all minute cracks that have been started in the corners by a blow, and remain unnoticed until the negative is laid in the printing frame, when the first application of pressure drives the crack entirely across the plate. Those who have felt the peculiar disappointment of having a good negative thus go to pieces before even a single print has been secured from it will thank us for reminding them that a skillful hand can *pinch off* a cracked corner with an ordinary pair of calliper-shaped tweezers. The flat-jawed kind should not be used. Cases often occur when this has to be done, for in the dim light of the dark room it can hardly be expected to see these little fissures, which are sometimes less than the twelfth of an inch in length, and might escape observation even if present before the glass was coated with the sensitive emulsion.

Another annoyance is occasionally to be found in the shape of small splinters of glass, which, likewise escaping notice in the dim,

red light of the coating room, fall on the surface of the plate and are caught by the emulsion, being dried into their place and incapable of removal without injury to a large portion of the film. After the film is softened by the developer, they may and indeed ought generally to be picked out carefully, but it will sometimes be better not to interfere with them at all. A thin sliver, say half an inch or an inch in length and not wider than a sewing needle, would be better let alone, and retouched as well as possible. If there were any fear of the negative cracking when printed, a frame with specially light springs might be selected for it.

Ragged and beveled edges are bad from the injury which they do to the fingers. If much of this sort of glass has to be handled, it would be worth while to set up a grinding stone in some convenient part of the dark room to remove the cutting edges. By this we do not mean the formidable affairs seen in carpenter's shops, but one of the long narrow scythe-stones which are held in the hand. A V-shaped groove should be cut along its surface with a three-cornered file, and the stone then secured to the dark-room shelf by means of a couple of nails. Many painful scratches and cuts might be avoided by this simple contrivance.

Splashes of the sensitive emulsion on the back of the plate do no particular injury unless the sensitive coating is very thin. In this case there may sometimes be an image of the same shape thrown on to the picture. Such plates as these would solarize very easily, and require great care in working. These splashes may be removed by rubbing with a little pumice-stone powder spread on a bit of india-rubber sponge and moistened.

Plates that are cut either too large or too small to fit the holders are intolerable nuisances. We should always return such plates to the makers or sellers. There are times, however, when the photographer may be so unfortunate as to be saddled with a certain number of such plates. When too large, it may be possible to cut off a quarter or eighth of an inch with the diamond, but it requires a very considerable degree of skill to perform the operation neatly. Perhaps the best plan is to draw the exact size required in ink on a clean sheet of cardboard, and having adjusted the ruler carefully, to wet the point of the diamond in the mouth before apply-

ing to the glass. It would not be amiss to have a strip of waste glass at hand on which the diamond could be tried before use; for, as all who have cut glass will agree, one's hands get out of practice quite quickly, and sometimes two or three attempts must be made before the diamond will cut. Supposing the glass to have been successfully cut by the first application, care must be taken not to loosen up the film when the strip at the edge is taken off. If it hangs on by the gelatine like a hinge, a sharp knife might be used to cut through the film. Those who cut plates directly through the film say that this method is preferable.

A word, before closing, on the different methods of changing plates. Double backs are invariably used in this country whenever glass plates are employed for negative-making. We have before now spoken of the advantages of the "changing box" for plates for out-of-door work. The reason why this very convenient piece of apparatus is now considered antiquated is simply that commercial gelatine plates were so irregularly and badly cut that they would not travel smoothly in the grooves of the changing box and holder. Until further improvements are made in transparent and flexible films, we might fairly ask whether this useful method of changing glass plates in outdoor work is not worthy of some consideration.

EICONOGEN.[1]

A. E. PRICAM.

DEVELOPMENT by eiconogen, introduced into the practice of photography by Andersen in 1889, has to-day a very large number of followers. Numberless formulæ have been published, and the chemical itself has been improved and made very easy of use. Like all new things, eiconogen has been extolled with an ardor perhaps excessive. For more than a year I have used this mode of development only. It is, then, the result of a careful experience that I take the liberty to communicate to the readers of this review. I have not the pretension to offer to them any-

[1] Translated for the AMERICAN JOURNAL OF PHOTOGRAPHY, from the *Revue de Photographie*, February, 1891.

thing entirely new, but I believe that by following the road which I have indicated to them amateurs will obtain results which will give them entire satisfaction.

Since its introduction eiconogen has presented itself under three different aspects. In the first place, it was a coarse powder, brownish and crystalline. It was produced afterwards under the form of sufficiently pure crystals of a pale yellow color, giving a clear green solution. Under this last form it happens occasionally that it produces a kind of spontaneous combustion, and the crystals become black, even when sheltered from the air and light. However, in spite of this alteration it preserves its developing properties.

Mr. Andersen proceeds to obviate the difficulty by introducing into the eiconogen a preservative without influence on the chemical, but which he assures us does that to which it pretends,—unlimited preservation. It will be sold in future under the form of white crystalline powder.

In consequence of the state of extreme division, it dissolves very rapidly in water. Mr. Andersen proceeds, moreover, to introduce into commerce small, cylindrical cartouches, 6 cm. long by 1 cm. thick. The contents are composed of pulverized eiconogen and sulphite and carbonate of soda. The first of these chemicals is separated from the others by a small ball of cotton, in order to better assure its preservation. It is sufficient to dissolve the contents of one of these cartouches in 100 c.c. of pure water to obtain a developer ready for use. This innovation will be valuable to travelers, who will thus dispense with weighing, often difficult to accomplish without a laboratory.

This is the way in which I prepare the solutions to be used in development. In practice it is good to have two baths of different strength. For instantaneous plates, for example, it is preferable to commence the development with a weak bath, adding to it the carbonate of soda, and to give vigor afterwards by applying the concentrated bath, adding the carbonate of potash.

I use habitually the following solution:

WEAK BATH.—NO. I.

A.

Warm water	1 litre.
Sulphite of soda	75 grams.
Eiconogen	15 grams.

B.

Water	1 litre.
Carbonate of soda	150 grams.

For developing, take three parts of A, for one part of B.

A STRONG BATH.—NO. 2.

A.

Warm water	1 litre.
Sulphite of soda	75 grams.
Eiconogen	35 grams.

B.

Water	1 litre.
Carbonate of potash	150 grams.

This last formula corresponds nearly to a saturation of eiconogen, for almost always there remain small crystals at the bottom of the bottle. For using, mix the two solutions in the same proportions as for the weak bath.

If over-exposure is perceived and the image appears too quickly, you should add a few drops of bromide of potassium, about ten per cent. However, if you are careful to commence with the weak bath, this medium is rarely necessary, for then you can develop the plate entirely without using the strong bath. The same portion of developer may be used to develop many plates successively, the only difference being that the image appears so much more slowly as the bath is more used.

When the plates are developed, the liquid can be poured carefully into a bottle with a lip, increasing by one-half of its bulk with water. It will still constitute an excellent developer for the proofs on bromide paper.

It is a good plan to push the development well to the end. It is better to obtain a plate too intense than a gray plate, for it is much easier to bring back to the desired density than to strengthen afterwards if it is too weak.

Once the plate is developed, I fix it in the following bath:

Water	1,000 grams.
Sulphite of soda	30 grams.
Tartaric acid	10 grams.
Hyposulphite of soda	200 grams.

This bath has the advantage of maintaining its purity perfectly after fixing a large number of plates; it gives besides a great deal of transparency to the half-tones. If, after fixing, the plate should appear too intense, it will not do to bring it back to the proper strength then, but return it to the fixing bath, and without washing it pass rapidly over the surface a small quantity of the following solution:

Water	100 grams.
Red prussiate of potash . .	5 grams.

This operation is repeated until the desired effect has been obtained; when this has been produced, stop immediately. There is now nothing more than to carefully wash the plate, which presents a very beautiful appearance, and which is, above all, absolutely devoid of color or fog.

This is a summary of my mode of working. I repeat that I have employed it exclusively for more than a year, and that I am perfectly satisfied with it. I hope that those workers who are willing to try it will be equally so.

A PERMANENT SENSITIVE PAPER: CHLORIDE OF SILVER CELLOIDIN.[1]

BY SIG. ARNALDO CORSI.

CELLOIDINA belongs to the group of collodion chloride of silver papers which were in use under the name of aristotype papers long before the gelatine papers were known.

The new preparation came into the market several months ago, and it is claimed to be superior to all similar papers, and it is strongly recommended to amateurs, giving especially fine results with strong negatives.

Having had an opportunity to try this paper, I found that it really possessed qualities not always found in others. I therefore consider it my duty to communicate some of my experiences and results to the society, hoping that others may be able to confirm or modify my assertions.

[1] Translated from *Bullettino della Societa Fotographica Italiana.*

The new product is sold in large sheets or in packages of cut sheets of the usual dimensions. In appearance it is between albumenized and the regular aristotype paper. In weight it is inferior to both. It is said to be permanent, but I have not been able to learn how far this claim for relative stability would reach, although I can affirm that so far as my experience goes (two months) I could not discover the least trace of any change.

Analyzing the composition which forms the cellulose base shows that it should keep a long time either before printing or after.

The picture is made like that of the aforesaid papers, only as new paper is very sensitive the prints must be carefully watched. It will have to be pushed beyond the right limit, as is done with albumen papers, while in the use of aristotype papers the limit is not surpassed. The prints are extremely fine in detail, far superior to those obtained on the other papers. The reason for this is the fineness and minute grain of the sensitive stratum.

More vigorous negatives can be used than with aristo paper without fear of obtaining hard prints.

It is advisable to use a combined fixing and toning bath, like that employed with the aristo paper in which the albumen is omitted, and where acetate of lead is substituted for acetate of soda, viz.:

Water, distil.	1000 c.cm.
Hyposulphite of soda	250 gr.
Ammonium sulph. cyanide	28 gr.
Acetate of lead	10 gr.
Chloride of gold solution 1:100 . . .	60 c.c.

The bath to be mixed four or five days before use.

I also used the regular formulæ for aristotypes, and obtained excellent results, although it required more time than with the other paper; granting this fact, it is more than counterbalanced by the regularity and ease with which the operation can be watched in the new paper. This tardiness depends probably upon the fact that the sensitive stratum of the film is less permeable; this reduced permeability causes the immersed sheets to curve so that the concavity tends towards the picture. With the

aristotype papers the effect is the contrary; the gelatine being very permeable, the immersed sheets curve with the convexity towards the picture.

The prints should be well washed, which may be prolonged *ad libitum* without danger of spoiling the prints or frilling the edges, as the sensitive stratum is very resistant. The prints can be laid between sheets of blotting papers, and then pasted successively on cardboard.

After drying completely the print recovers the smoothness of its surface. If desired, the prints may be burnished same as an albumen print, when they assume a lustre like an enamel. This cannot be done, as it is with gelatine papers, by squegeing upon a highly polished surface. Even without burnishing the prints are more brilliant than those obtained with albumen paper, provided that the contrasts are sufficiently marked.

Another peculiarity of the new paper, and which also depends upon the permeability of stratum, is the fact that, after drying, the prints repel the water with which we try to wash them, a thing which never happens with the gelatine, which on the contrary absorbs that liquid to the detriment of the lustre,—another reason for receiving the former with favor.

In conclusion, we may say that the celloidin paper can be substituted for albumen papers, and the amateur may thus avoid many failures, especially the unreliability of the ready prepared paper. The finished prints also show greater natural lustre and more varied tones in the shadows.

It can be substituted for aristo paper with great advantage, especially in case of intense negatives. Further, the new paper has the advantage of deteriorating less easily during the process of washing and drying.

Comparatively with aristo paper celloidin paper has greater conservability, greater rapidity of impression, and beauty of the picture.

DARK-ROOM VENTILATION.

THE modern photographer is very well catered for in the matter of literature. Not only has he many journals and periodicals, both English and foreign, all to himself, but he has a rich library of books, all dealing with questions directly relating to the occupation in which he is engaged. A few years ago, before gelatine plates came into common use, such books were so few in number that they could almost be counted upon the fingers of one hand; but with the creation of the modern amateur there came a change over the scene, and text-books and hand-books without number were issued, until it became a serious matter for an author to find a title for any new publication which he might be contemplating. Authors now seem to be attacking the art piecemeal and in detail. They no longer find it possible to compress an entire account of the various processes into one volume, and so we have separate brochures on such subjects as developing, retouching, portraiture, etc., which in themselves begin to form a complete library. There are so many workers, and the army is so constantly receiving recruits, that there is little fear of such books—especially if they are written with a fair amount of skill—not meeting with a ready sale.

But there is one subject which, we think, has not been treated as exhaustively as it should be, considering its great importance. We allude to the ventilation of the dark room, in which the photographic worker is obliged to pass so much of his time. An ordinary room is, as a rule, well ventilated,—that is, unless it belongs to one of those overcrowded dwellings in the East End of which we have lately heard so much,—for an ordinary dwelling room has its chimney, its windows, and its doors, and as most rooms are found in houses in which neither doors nor windows fit into their frames, and in which nooks and crannies in floors and wainscots let in the winds of heaven from every conceivable direction, there is little chance of suffocation. The favorite Parisian method of committing suicide by burning charcoal in a closed room has never found favor in England,—most possibly

because of the utter futility of attempting it. The jerry builder has made it impossible, and this seems to be the only good thing that a jerry builder has ever done.

But in the photographer's dark room the conditions are altered. There is often no chimney, the window is carefully covered up with opaque material, except a single red pane, and even the door is lushed with cloth all round to keep out any stray ray of light which may endeavor to find an entry. This is as it should be; but the photographer too often forgets that in thus shutting out the daylight, which is so prejudicial to his proceedings, he has also been excluding the fresh air, which is so necessary to health; and as good work is only possible if the worker be in good health, he indirectly is affecting the first by neglecting the second.

We constantly hear of operators who complain of the bad effect of certain chemicals upon their well-being. Ammonia, being the only chemical in common use which has a pungent smell, is credited with all sorts of direful effects. One worker told us gravely how continued use of that agent had made him deaf. Another spoke of the injury which it had caused to his respiratory organs. Many, also, have complained of the lassitude and headache which they suffer from after an unusually long spell of development. Now we are quite satisfied, from the many opportunities which we have had of seeing all sorts and conditions of dark rooms, that in the majority of cases no fault can be laid to the odor of chemicals. The mischief is almost always traceable to the want of ventilation.

Even in studios where everything is well appointed, where there is a handsome reception-room, and where all strikes the eye as being expensive and good, the dark room is often little better than a mere cupboard.

Well may the operator call it his den. There he is condemned to work, and although he may not use ammonia or any other strongly smelling chemical, he is giving off from his own lungs a far more poisonous product, in the shape of carbon dioxide, than anything that he has in the bottles around him. If he has a lantern as an aid to uncertain daylight, its lamp is also busy in the same work of vitiating the atmosphere. It is no wonder that

the poor fellow feels done up at the end of the day's work. And the remedy is so easy. Let him bore a few holes in a row at the bottom of the door, and cover them with a sloping board, in order to give entry to fresh air from outside. Then, with a ventilator at the top of the room, which can be equally well shielded against light,—to provide egress for the heated air inside, which is bound to rise upward,—he will secure a constant current, which will make his work easier and more pleasant than it has been before, for he will no longer be suffering from deprivation of fresh air.—*The Photographic News.*

PHOTOGRAPHS OF TYPHOID GERMS.

DR. Charles M. Cresson has succeeded in producing two fine photographs of the bacillus believed to be the cause of typhoid fever, which he has found in drinking water. The micro-organisms are enlarged about 3500 diameters, and present the appearance of small dumb-bells. The photographic positives are five inches in diameter, yet the field is beautifully clear and the bacilli very distinct. With them are numbers of other bacilli believed to be the ultimate cause of dysentery. These resemble the so-called typhoid bacilli, but are much smaller.

The method by which these specimens have been prepared is interesting. When a suspected water is presented to the expert it is thoroughly agitated and then poured into a glass receiver, which has been previously thoroughly cleansed, and allowed to settle. The receiver tapers gradually to a small orifice, which is closed by a stop-cock. The top is ground, and is covered with a ground-glass plate to prevent the introduction of adventitious matter that might be floating in the air. After a number of hours have passed, and all solid matter, including the germs, have settled in the bottom, a single drop is allowed to escape upon a glass slide, which is immediately examined under the microscope, first with a comparatively low power, and finally with the finest immersion lenses. Where advisable, chemical examination of the water is also made, but the chief reliance is placed on the microscopic organisms found. It is a singular yet easily explicable fact that the clearest and most transparent waters often contain the most dangerous germs. This is especially true of well water, the filtration which the water gets in percolating through the soil being sufficient to remove all

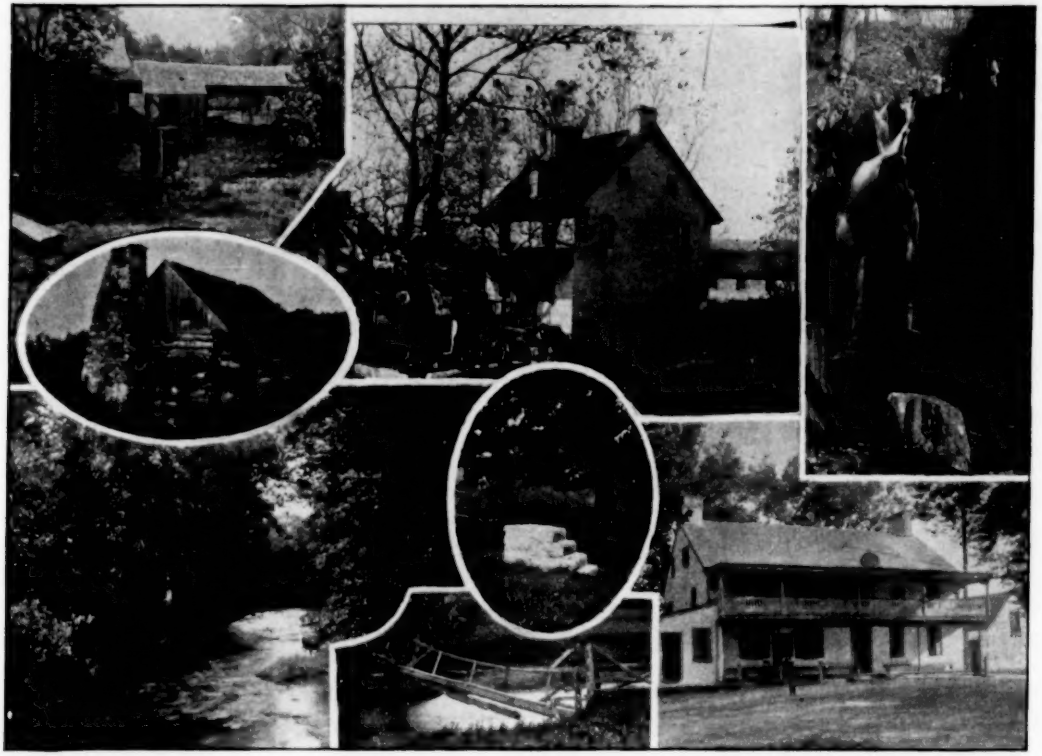
particles visible to the eye, but useless to restrain the ingress of these minute yet highly dangerous germs. Muddy water, on the contrary, is usually the result of heavy rains and freshets, which have washed out the streams and destroyed the breeding places of these vegetables, and in so doing has carried down a large quantity of perfectly harmless mineral matter.

Dr. Cresson makes regular reports to the Board of Health on the waters supplied to the various pumping stations of the city, and examines besides a large number of private sources of water supply in and around the city. So characteristic are the microscopic organisms that he meets with that he can usually identify the source of the water at once. While unwilling to be quoted as absolutely endorsing the Schuylkill water as at present supplied, he asserted that it was at least as good as the water supplied to most large cities, and was infinitely better than much of that derived from private sources or from several which had been suggested as a possible source of supply for the city. His researches have extended over many years, but his final conclusions are not ready for publication. The photographs which he has made are probably the largest and clearest direct photographs that have yet been made of this particular organism. He declined to reveal the source of the water from which the specimens had been obtained.—*Public Ledger.*

The address from a number of Christian women, stated to be five hundred in number, to the Hanging Committee of the Philadelphia Academy of Fine Arts, protesting against the public display of nude art as shown at the last exhibition, and the pertinent reply by the Committee of Artists, has aroused much discussion upon the subject, pro and con, in different parts of the country.

Without going into the merits of the discussion, we would only call the attention of the parties interested to the fact that, strange as it may seem, the effect of their agitation has been the means of causing renewed attention to the study of that branch of art which they wish to suppress. This revival has been so widespread, it is said, that now there is not a professional model in the Quaker City whose time is not engaged ahead. Moral: "It is an ill wind," etc.

Indulgent Father—"Yes, your son can become a photographer; anybody can. Buy him a hand-camera, then let him pull the string, and you pay for the fun."



A RAMBLE IN THE CHESTER VALLEY.

FROM DEVON
AND ITS
HISTORICAL SURROUNDINGS.

ENGRAVED BY THE
PHILADELPHIA PHOTO-ELECTRO CO.,
707-9 FILBERT ST., PHILA.

HISTORICAL.

EARLY RESEARCHES IN THE FIELD OF THE ACTION OF LIGHT.

THE following notes are a translation taken from Dr. Eder's great work now being issued in German and were lately read before the Holborn Camera Club by E. J. Wall.

By the word photography I mean the comprehensive field of the action of light, not the restricted sense in which we at present apply it. The first mention of the action of light which can be traced is made by Aristotle, 400 B.C., who noticed that plants which were not exposed to the light were white instead of green. A patent has been taken out in England within the last three months for protecting paint from the effects of light and air by mixing it with wax, a device mentioned by Vitruvius, 100 B.C. Probably, however, the English Patent Office knew nothing of this fact, and if they did would have disregarded it. Pliny, 100 B.C., mentions that silver was darkened when exposed to the air, but probably this refers merely to the action of certain sulphurous compounds, and not to the action of light. Dioscorides states that light will bleach turpentine. We have now a long gap from Aristotle and Pliny to the beginning of the fourth century, when Julius Firmicus Maternus, the first of the alchemists, writes on the importance of the stars, moon, and sun and their light for the success of certain alchemistic works, and this belief runs through the whole of the mediæval alchemistic works.

At the commencement of the tenth century we find Eudoxia, the famous daughter of the Emperor Constantine VIII., writing a small treatise on the dyeing of linen and fine cloths by means of the juice of certain species of shell-fish, wherein she writes: "The purple colour is only excellent when the cloth is placed in the sun. For the rays of the sun give it a great fire, make the colour darker, and its gloss is only brought to perfection by the fire from above." About the sixteenth and seventeenth centuries distillation was effected by means of the sun's rays focused on the alembics; nor was the heat of the sun alone considered essential, its light

being considered to play an important part in the distillation of the various elixirs and love potions for which the alchemists were so famous. Gerber, in 1751, ascribes to the light and heat of the sun the power of converting copper into gold, a process which many of us would doubtless at the present time make use of were it of any good. Helcher, in 1718, describes the preparation of a wonderful *elixir vitæ*, or tincture of gold, and states that where exposed to light the impure and gross matter is precipitated, and the true and veritable *vitæ principium* remains in solution; thus ignorantly ascribing to the black deposit of metallic gold the character of a gross impurity, and ignorantly describing the decomposition of our stock solutions of chloride of gold which most of us have met with.

Thus far we have considered merely the general effects of light on general matter. Nowhere do we meet with any mention of the true chemical action set up by light, which was not recognized even by such well-known scientists as Roger Bacon, Baptista Porta, the inventor of the camera, Kepler, Huyghens, and Newton, who died in 1727.

We now come to the first mention of the darkening of a silver salt in light, and even then the true nature of the action of light was not known. The renowned doctor Albertus Magnus, who lived from 1193–1280, writes as follows of nitrate of silver: "It colours the human skin with a black colour very difficult to remove." Glauber writes in 1658, in his "Explicatio Miraculi Mundi": "When one distils a strong water from saltpetre and vitriol, and dissolves a little silver in it and adds some rain-water, so as to break down the *aqua fortis*, such water colours not only hard wood equal to ebony, but also leather and feathers coal-black." Boyle, an Englishman, states in 1660 that solution of gold colors the skin, nails, etc., a purple red. In 1686 Ray stated that light caused the green color of plants; and about this time further notes were made on the juice of the purple shell-fish. In the year 1725 we find a Russiun field-marshal preparing a secret medicine, or elixir, from ferric chloride, and utilizing the action of light to reduce this to the ferrous chloride, and this is the first notice of the action of light on a salt of iron that can be traced.

In the year 1727 a German doctor, J. H. Schulze, whilst investigating the properties of a phosphorescent compound, tried the addition of solution of nitrate of silver to chalk, which was used in the preparation of the phosphorescent stone, and by chance he performed his experiment in front of a window through which the sun shone strongly, and, to his astonishment, he noticed that the side of the precipitate facing the window turned dark, whilst the side away from the light remained colorless. He continued his experiments, and conclusively proved that light, and not heat, produced the blackening ; and he was therefore the true discoverer of the light sensitiveness of the salts of silver, and he was also the first to use silver salts for obtaining impressions of objects, and thus may be said to be the true Father of Photography, and not Daguerre, to whom we have lately had a monument erected in America.

To a French academician, Duhamel du Monceau, belongs the credit of being the first to discover the different chemical action of different colored light, as in 1736 he published some researches on the coloring matter of cochineal, and stated that the color was bleached out very much quicker under tolerably opaque paper than under much thinner and more translucent yellow and red paper.

Dr. Eder states that about this time a German professor, Kaspar Neumann, noted the light sensitiveness of mercury salts, and Eder says that this was the first mention that he has been able to find. I have in my possession, however, an old book published in 1713, which is the fourth edition of the translation of a Latin work on medicine, in which the translator directs certain mercury salts " to be dried in the shade," thus clearly recognizing the action of light on the salt. I have, unfortunately, been unable, from want of time, to turn up the earlier editions of this work, but certainly this date, 1713, is prior to that given by Dr. Eder.

In the year 1737, Hellot, a Frenchman, suggested a solution of chloride of gold as a sympathetic ink, and also used nitrate of silver for the same purpose. In 1761 appeared that curious work, " Gyphantia," which contains such a curious prophecy of the wonders of photography, and yet we are almost able to believe that

the writer had heard or seen something of the experiments which Schulze had made in 1727, and had allowed his imagination to run riot and given us that particular picture. In 1764 we find that people with auburn, not to say red, hair were quite willing to make use of nitrate of silver to alter the color of the same; and I have an old receipt for a hair dye which is stated to be "that used and recommended by y^{e} famous and learned doctor of physic, Robert Beaton, by y^{e} Savoy Stairs," and on it is written, in faded ink, the date 1763.

In 1776 Professor Bergmann, of the University of Upsala, in a treatise, "De Acido Sacchari," or what we now call oxalic acid, mentions the light sensitiveness of oxalate of mercury; and this is the first notice of an important fact which has been utilized by Mr. Willis in his platinotype process, by Pizzighelli in his printing-out platinum process, and has also been utilized more than once in the preparation of chemical photometers.

In the following year, 1777, Scheele, the famous Swedish savant, published some valuable researches upon the nature and properties of air and fire, which contains some valuable notes upon photo-chemistry. He found that the oxides of silver, gold, and mercury were reduced to the metallic state at the focus of a magnifying glass; and he made the first known statements upon the photo-chemistry of chloride of silver, and used even chloride of silver paper, and recognized the different behavior of chloride of silver acted upon by light and that unacted upon when in contact with ammonia. Actually Scheele fixed his experiments or prints with ammonia, and he also recognized that the black precipitate contained metallic silver.

Scheele was the first who allowed the solar spectrum to act on chloride of silver paper, and found that the violet end of the spectrum acted a great deal quicker than the other parts. He also proved that neither the heat of the sun nor of the fire produced the blackening, and that the light alone acted. About the same time as this Priestley began to study photo-chemistry, but his researches had but little actual bearing upon photography.

As we have already seen, Professor Bergmann had discovered the light sensitiveness of the oxalates; and in his work, published

in 1779, he says: "The solar rays make oxalate of silver dark." He also recognized that sulphate of silver blackened in light, but less quickly than chloride of silver.

We now come to a series of observations upon the photo-chemistry of certain resins, and possibly on these foundations was laid the first photo-mechanical printing process. Hageman, of Bremen, published, in 1782, his notes on the blue coloration of gum guaiacum, and it is a well-known fact that Niepce first experimented with this gum resin. Senebier, in 1782, continued these researches, and examined limewood, rosewood, oak, bearberry, and hæmatoxylin woods, as well as the action of light on such gums as gamboge, animi, sandarac, mastic, etc.; and Dr. Eder states that it is not only probable, but also most likely, that these researches led Niepce to the further examination till he discovered the light sensitiveness of asphalt.

Senebier made very extensive researches with chloride of silver, and gave the following table of the time required by the different colored rays of light:

Violet	light	darkened	it	in 15	seconds.
Purple	"	"	"	" 25	"
Blue	"	"	"	" 29	"
Green	"	"	"	" 37	"
Yellow	"	"	"	" 5½	minutes.
Orange	"	"	"	" 12	"
Red	"	"	"	" 20	"

Senebier also noticed that the prismatic spectrum communicated a violet color to the chloride of silver with a tinge of blue, and that this color became brighter the nearer the less refrangible or red end of the spectrum was approached. This is the first intimation of the property of chloride of silver of assuming the various colors of the spectrum; and, as Dr. Eder says, Senebier appears to be the first forerunner of Seebeck's discovery of the reprodution of the natural colors of the spectrum.

Schulze's and Hellot's observations of the previous century were entirely forgotten or lost in the old libraries and other archives, for we must not forget that learning was not so far advanced as at the present time, nor were there quite so many

journals and papers which would naturally, judging from the present time, lead to the interchange of experiences and thoughts.

We now come to the close of the eighteenth century, and find Scopoli, of Pavia, discovering the sensitiveness to light of prussiate salts, a fact utilized in the "blue" printing process. Berthollet, in 1786, again examined chloride of silver, and states: "If one exposes chloride of silver, covered with water, to the light, the surface quickly becomes black and a lot of small bubbles are set free, which to all appearances are 'life air' (oxygen), . . . for this is not firmly combined to the silver precipitate. The silver precipitate is not reduced to its metallic state; it always retains some oxygen." According to this statement, Berthollet was the first who expressed the opinion that silver chloride was not converted by light into metallic silver, but into subchloride or oxychloride of silver.

Robinson about this time experimentally proved a fact which was later enunciated by Draper as one of the laws of photo-chemistry,—viz., that when the rays of light acted upon a substance, they were incapable of exerting further chemical action. In 1792 Vassali presented to the Royal Academy of Turin his researches upon chloride of silver, and he stated that not only sunlight but also candle- and lamp-light exerted a chemical action on chloride of silver and colored it, even though faintly. He also found that the light of the moon, concentrated by a condenser, faintly darkened it in four hours. In the year 1793 Trommsdorff found that benzoate of silver darkened in light.

We now find for the second time in the whole history of photo-chemistry one of the fair sex making experiments; and in a work published in 1794 Mrs. Fulhame, an English lady, describes the method of silvering and gilding cloth, etc., by saturating the same with silver and gold solutions and exposing it to light.

In 1798 Vauquelin discovered chromium and chromic acid, and stated that chromate of silver darkened in the light. And Dr. Eder states that he believes that Ponton knew of this discovery of Vauquelin, and in trying the sensitiveness of chromate of silver found the sensitiveness of the chromate salts on paper. Vauquelin also discovered the sensitiveness of citrate of silver. In 1800

Buchholz observed the blackening of carbonate of silver; and in this year also the sensitiveness of molyboic acid was discovered by Jager. And in 1800 Herschel discovered the invisible red rays of the spectrum; and in 1802 Wedgwood discovered photography on leather and wood, and Davy described these experiments more fully; and Dr. Eder points out that everything that Wedgwood did and Davy described was certainly discovered and known by Schulze in 1727, Beccarius in 1757, Hellot in 1737, Scheele in 1777, and Senebier in 1782.

The commencement of the nineteenth century, from 1801–1810, was pregnant with important discoveries, and from then to 1839, when Daguerre made his discovery, is perhaps one of the most fruitful times in discovery; but to fairly treat of this and the subsequent years—from 1839 to 1891—would entail rather more labor and time than I can well now spare, and would also weary you; but in the above brief sketch of the rise of photo-chemistry, prior to the nineteenth century, I have endeavored to curtail my notes as much as possible; but I think I have given you enough to prove that photography is by no means the sudden, happy discovery by one man, but that the fabric has been built up by the hands and labor of countless workers, and that we may expect as great, if not far greater, advances in the future than in the past; and perhaps some future time I may be tempted to continue these notes and trace the more recent advances, and try and show you the wide and innumerable applications of photography to science and art.— *Photographic Reporter.*

The latest news from "Sister Rose Gertrude" is to the effect that she is about to leave Hawaii, and is to travel in the South Sea Isles with the object (*inter alia*) of securing photographs of lepers; in order, it may be presumed, to bring home tangible evidence of the dreadful state of things which prevails in some of those "earthly paradises." Verily the uses of the camera are manifold!

AN ADDRESS TO THE INVENTORS OF AMERICA

ON THE CELEBRATION IN WASHINGTON, D. C., APRIL 8–10, 1891, OF THE BEGINNING OF THE SECOND CENTURY OF THE AMERICAN PATENT SYSTEM.

EDWARD T. FENWICK.

THE completion of the first century of the American Patent System marks so important an epoch in the history of the nation that it is eminently proper that the beginning of the second shall not pass unnoticed. The centennial anniversaries of other important national events have been celebrated in a manner worthy of a people proud of their country and its growth. Surely the system that has aided the agriculturist in the field, the mechanic in the shop, and the toiler in the mine, that has stimulated invention and helped every branch of modern industry, has played no small part in a history so full of the triumphs of human achievement.

Believing that the American inventor and manufacturer of inventions will regard it a privilege, as well as a duty, to coöperate in making due recognition of these facts, it is proposed to hold a celebration at the national capital in April, 1891, which shall in a fitting manner commemorate the important event, and place on record the nation's appreciation of the labors of those whose ingenuity, patience, and tireless efforts have exercised such a potent influence in accelerating the prosperous growth of the nation, and in aiding the progress of our civilization.

The necessity for a National Association of Inventors, organized for mutual benefit, has been frequently discussed in the technical and other journals. No time could be more opportune for the formation of such an association than when men from every part of the country meet to celebrate so important an anniversary.

The Central Committee is composed of Messrs. John W. Babson, Robt. W. Fenwick, B. H. Warner, Prof. Otis T. Mason, M. M. Parker, Hon. John Lynch, M. C. Stone, and J. Elfreth Watkins, representing the most prominent business interests in Washington, and has the earnest coöperation of Senators Platt and Teller, Representative Butterworth, and other members of the Congressional Patent Committee, and Honorable C. E. Mitchell, Commissioner of Patents, Dr. G. Brown Goode, Curator at the National Museum, Hon. A. R. Spofford, Congressional Librarian, and others of the officials of the governmental departments.

A systematic effort is being made with the view of obtaining information as to the most suitable men to be appointed from the different states of the union as delegates or representatives to the centennial celebration.

The responses received are indicative of the great interest being manifested by leading inventors of the country, as well as manufacturers of patented articles.

The Committee on Literature have arranged the following order of exercises, which without doubt will prove one of the greatest literary treats of the nineteenth century.

First public meeting, afternoon April 8th, 1891.

To be presided over by the President of the United States.

Second public meeting, April 8th, 7 to 8.30 P. M.

To be presided over by the Hon. J. W. Noble, Secretary of the Interior.

Special reception to inventors and manufacturers, and the ladies who accompany them, at the Patent Office, April 8th, 9 to 11.30 P. M., by the Hon. John W. Noble, Secretary of the Interior, and the Hon. C. E. Mitchell, Commissioner of Patents.

Third public meeting, afternoon April 9th, 1891.

To be presided over by the Hon. Frederick Fraley, LL.D., President of the National Board of Trade and the American Philosophical Society, and Charter Member of Franklin Institute.

Fourth public meeting, evening April 9th, 1891.

To be presided over by Prof. S. P. Langley, LL.D., Secretary of the Smithsonian Institution.

Anniversary day, April 10th, 1891.

Anniversary of the signing of the first American patent law, "An Act to Promote the Progress of the Useful Arts," by George Washington.

10 A. M., Excursion to Mount Vernon, where an address will be delivered by J. M. Toner, M. D., of Washington, upon "Washington as an Inventor and Promoter of Improvements."

Fifth public meeting, April 10th, 1891.

To be presided over by Prof. A. Graham Bell.

Addresses upon the following subjects are promised at the public meetings:

Edward Atkinson, Ph.D., LL.D., of Mass.; Invention and Its Effects upon Household Economy.

Dr. John S. Billings, Curator U. S. Army Medical Museum; American Inventions and Discoveries in Medical Surgery and Practical Sanitation.

Hon. Samuel Blatchford, Justice of the SupremeCourt of the U. S.; A Century of Patent Law.

Cyrus F. Brackett, M.D., LL.D., of New Jersey, Professor of Physics, College of New Jersey, Princeton: The Effect of Invention Upon the Progress of Electrical Science.

Hon. Benj. Butterworth, Ohio, U. S. House of Reps.; The Effect of Our Patent System on the Material Development of the United States.

Octave Chanute, of Illinois, President of the American Society of Civil Engineers; The Effect of Invention upon the Railroad and Other Means of Inter-Communication.

Prof. F. W. Clarke, S.B., of Ohio, Chief Chemist Geological Survey; The Relation of Abstract Scientific Research to Practical Invention, with Special Reference to Chemistry and Physics.

Hon. John W. Daniel, of Virginia, U. S. Senator; The New South as an Outgrowth of Invention and the American Patent Law.

Maj. C. E. Dutton, Ordnance Dept., U. S. A.; The Influence of Invention Upon the Implements and Munitions of Modern Warfare.

Thomas Gray, C.E.B. Sc., F.R.S.E., of Indiana, Professor of Dynamic Engineering, Rose Polytechnic Institution, Terra Haute; The Inventors of the Telegraph and Telephone.

Prof. Otis T. Mason, Ph.D., of Virginia, Curator U. S. National Museum; The Birth of Invention.

Hon. C. E. Mitchell, of Connecticut, Commissioner of Patents; The Birth and Growth of the American Patent System.

Hon. O. H. Platt, of Connecticut, U. S. Senator; Invention and Advancement.

Col. F. A. Seely, of Pennsylvania, Principal Examiner, U. S. Patent Office; International Protection of Industrial Property.

Hon A. R. Spofford, LL.D., Librarian U. S. Congress; The Copyright System of the United States, its Origin and Growth.

Hon. Robert S. Taylor, of Indiana; The Epoch-Making Inventions of America.

Robt. H. Thurston, A.M., L.L.D., Doc. Eng., of New York, Director and Professor of Mechanical Engineering, Sibley College, Cornell University; The Inventors of the Steam Engine.

W. P. Trowbridge, Ph.D., LL.D., of New York, Professor of Engineering, School of Mines, Columbia College; The Effect of Technological Schools Upon the Progress of Inventions.

Hon. Edwin Willits, of Michigan, Asst. Secy. of Agriculture; The Relation of Invention to Agriculture.

Hon. Carroll D. Wright, M.A., of Washington, Commissioner of Labor; The Relation of Invention to Labor.

Committees on Reception, Public Comfort, Transportation, and Finances have been appointed, and are actively engaged making reasonable terms with hotels, private boarding houses and railroad companies, and arranging for a right royal reception to visitors, and completing the arrangements for the publication of two or more handsomely printed volumes of 500 pages, to contain the addresses delivered by the eminent speakers, together with notices of some of the most celebrated American inventions.

It is hoped that all inventors who can make it convenient will take a part in this celebration, which forms so important an epoch in our country's history.

THE PHOTOGRAPHIC SOCIETY OF PHILADELPHIA.

A STATED meeting was held on Wednesday evening, March 11th, 1891, the president, Mr. John G. Bullock, in the chair.

A report from the Committee on Lantern Slides was read, relating to the public exhibition held on the evening of February 20th at Association Hall, representing the work of members of the society. The exhibition was an entire success, being not only fully equal in artistic merit to previous exhibitions, but far exceeded any in its pecuniary returns. One hundred and ninety-one slides were shown by fifty-one members.

Dr. Mitchell opened the subject announced for discussion, "Dark Room Illumination," and exhibited a lantern which he used in his own dark room. The general objection to the illumination of a dark room by means of colored light, particularly ruby light, was that in a short time it generally affected the retina very injuriously, and really produced a form of congestion. It acted very strongly on the eyes of individuals whose retina was a little more sensitive to the colors to which one is limited in the dark room. The light was generally thrown directly in the face of the operator, or very nearly so, so that while looking at the plate he received, more or less, the red rays in his face. To develop a plate an operator did not need the light in his face,—he wanted it on his plate,—hence after some consideration he had had constructed for his own use the lantern now exhibited, in order to concentrate the rays solely upon the plate.

The lantern was a square tin box, with the ruby glass inserted in the bottom. The intention was to suspend the lantern above the developing tray, all light thus being shut out directly from the eyes of the operator. The light was furnished from an Argand burner. The

Doctor stated that he had worked for five or six hours at a stretch with this lantern without feeling any more effect than if he had been reading a book by ordinary lamplight.

For the purpose of overcoming the shadow caused by the lighting apparatus, the president stated that he had used a lantern similar to the one shown by Dr. Mitchell, arranged for the gas to come in from the rear. He used a large fish-tail burner, placed parallel with the glass, and by that means avoided shadow.

Dr. Mitchell suggested that the most perfect thing would be a ten- or fifteen-candle-power incandescent burner, which one could readily turn on or off, as desired.

The Doctor also exhibited the Aurora lamp, a smaller lamp of the ordinary form, which was arranged so as to permit the turning up or down of an oil light from the outside. The oil reservoir could also be taken out altogether for filling purposes.

A small lantern for use when traveling was next shown and described by Dr. Mitchell. It was lighted by means of a candle, and when set up was of a triangular shape, two sides being of tin and one of ruby glass.

Mr. Rau described an Aladdin lantern which he had in his dark room, in which he burned sodium core. An orange chimney could be used, if desired.

In response to a question from Mr. Vaux, Mr. Rau said it was claimed that the sodium core would burn forty hours.

Dr. Mitchell alluded to a subject which he thought pertinent to the discussion on dark room illumination,—*i. e.*, the degrees of light which are thought to be injurious to the plate. Some operators thought it was almost necessary to develop and handle plates in Cimmerian darkness, so to speak, and it was a strain on the eyeballs to catch any sign of the image on the plate. He must say he was an advocate for plenty of light. He had always used a great deal of light for changing plates and in the dark room for all purposes, and he had never seen any injurious results. It might not do for orthochromatic plates, but with that exception he thought one or two thicknesses of yellow post-office paper, with a proper amount of care, would suffice for the most sensitive plate. A newspaper could be read by the light he had in his dark room, and it was much better to have plenty of light for all purposes. He developed right under the light, and had never had any fogged plates. There had been no changes made by the light, as he had repeatedly exposed part of a plate to the light, covering the rest, and the portion exposed showed no trace at all of the action of the light.

Referring to the method of development in ordinary light by means

of "Nuktigonia," an orange-colored developing fluid, Dr. Mitchell said this was a solution of a very strong orange-colored aniline dye, and the plate had to be placed in the solution in the dark room, or in some way by which actinic rays could not reach it, but after that development could be conducted without any trouble. Some of the members might be astonished to learn that a plate of ordinary sensitiveness, after development had been pretty well carried on,—particularly pyro development,—could be taken out in a strong light and the plate finished.

Mr. Rau described an apparatus made by him for use while traveling in the East with Mr. Wilson. It consisted of a cylinder made by rolling several sheets of Carbutt's ruby paper on a stick. Whenever he desired to change his plates, he stood this cylinder over a light placed in a box lid, and though it lit up the whole room he never lost or fogged a plate. Of course they did not then use as rapid plates as at the present time. The cylinder did not break, and the same sheets were used during the whole journey—six months probably. The light used was a candle, and the top of the cylinder was turned over.

Mr. Chapman described a method of lighting the dark room from outside, thus avoiding the discomfort from heat and exhausted air. The lamp could easily be placed on the window-sill outside, and the colored fabric against the glass, made to fit closely to the window frame.

Mr. Ives said he had several dark rooms in use, and wherever he uses artificial light he placed it immediately outside the window of the dark room, so that all the heat was out of the way.

Dr. Mitchell said he had noticed in the British journals, almanacs, and year books, by several different authorities, that it was quite possible to change plates by candlelight. He did not know whether it was a yarn or not, but it was stated as a fact. The candle was placed in such a manner and so shaded that the direct light did not fall on the plates. It was stated the actinic light was so small that it would have no injurious effect upon the plates.

Mr. Ives said he had changed plates in that way a hundred times, and he had had no trouble with the plates. Still he did not think it safe to advise people generally to do this, but it could be done.

Mr. Wilson facetiously remarked that plates were very rarely fogged in the dark room anyway. It was usually the fault of the plate. (Laughter).

Mr. Ives said it should be understood that most of the sensitive plates in the market were considerably sensitive to the true red rays of

the spectrum. It was not a good idea to leave plates exposed to red rays for a great length of time. He knew, by experiment with some of the rapid commercial plates, that landscapes could be made by the action of the true red rays of the spectrum. With a rapid-working lens and an exposure of about fifteen minutes very perfect work could be done, and no rays acting except the true red rays. Such pictures he had made, therefore these plates should not be exposed to red light for an unnecessary length of time, otherwise it would be bound to produce some effect. With the orange light he knew that the picture could be made with a shorter exposure. Ordinary plates were least sensitive to the red, then to the orange or yellow,—but sensitive enough to the true red rays of the spectrum to permit of a landscape being made with the exposure above noted.

The secretary suggested that a shelf under the developing table was a very good way to cover up the plate. It was always there when wanted, and saved the trouble of hunting in the dark for covers, which could not be found when most wanted.

Mr. Ives used a hinged lid for this purpose, which he turned down over the developing disk when he desired to cover the plate. He found it very convenient.

Mr. Vaux desired to call the attention of the members to an article by Mr. M. C. Lea in the last number of the *American Journal of Science* on "Gold-Colored Allotropic Silver." The article had along with it three or four plates illustrating the very brilliant colors which Mr. Lea had produced in connection with his investigation. Adjourned.

ROBERT S. REDFIELD, *Secretary.*

Stolen.—From M. B. Brady, the well-known photographer in Washington, D. C., a Dallmeyer rapid rectilinear lens, 21x25, No. 44,338. Any one to whom this lens should be offered or who may discover its whereabouts will confer a favor and obtain a suitable reward by notifying the owner.

Wonders of Science.—Lady: "Do you take instantaneous photographs?" Photographer: "Yes, madam; I can photograph a humming-bird on the wing or a swallow in its flight." Lady: "I want my baby's picture taken." Photographer: "Yes, madam; get the little fellow ready, and I will prepare the chloroform."—*New York Weekly.*

PHOTOGRAPHERS' ASSOCIATION OF AMERICA.

AN executive session of the board of officers was held at the Iroquois Hotel, Buffalo, N. Y., January 21st, 1891. All the officers were present, namely: Geo. H. Hastings, president; S. L. Stein, 1st vice president; W. Stuber, 2d vice president; G. M. Carlisle, treasurer; and W. A. Davis, secretary. After an address of welcome by the president, the reports of the secretary and treasurer were read. President Hastings appointed Messrs. Stein, Stuber, and Davis as an Auditing Committee, who reported that they had found the accounts correct, and the committee was discharged.

The Twelfth Annual Convention will be held on July 14–17, inclusive, at the Buffalo Park Association, Buffalo, New York. Dr. A. H. Elliott was appointed a committee to report on the "Progress of Photography."

AWARDS FOR AND RULES GOVERNING EXHIBITS, AND SUGGESTIONS TO ALL EXHIBITORS IN THE ART DEPARTMENT.

List of awards for 1891 is as follows: The Grand Prize will be a group in bronze, with marble pedestal, "The Victor," value $175, governed by the following rules and regulations:

Competitors for this award shall exhibit three plain photographs, illustrating Tennyson's poem "Elaine."

The size to be not less than 13, or more than 22 inches in length.

The pictures must be framed, either with or without glass. The award to be made for the most meritorious collection.

A diploma will be awarded for the second best collection.

Class A.—A beautiful marble bust, value $125, for the best exhibit of genre photographs.

Competitors for this class shall exhibit six photographs. The subjects are to be chosen by the photographer and appropriately inscribed; and size to be not less than 13 or more than 22 inches in length, and framed, with or without glass. The award to be made for the most meritorious collection.

A diploma will be awarded for the second best collection.

Class B.—One gold, one silver, and one bronze medal for the best collection of portrait photography, size 14 x 17 inches, or larger.

Class C.—One gold, one silver, and one bronze medal for the best collection of portrait photography, size 11 x 14 inches, or smaller.

Class D.—One gold medal for the best collection of landscape photographs with figures introduced.

Class E.—One silver and one bronze medal for the best collections of landscape photographs without figures.

One silver medal for the best collection of marine views.

One silver medal for the best collection of architectural views.

Class F.—One silver and one bronze medal for the six best plain enlargements, either in silver, bromide, albumen, carbon, or platinum; the size to be not less than 18x22 inches.

PRIZES FOR EMPLOYEES.

Class G.—One gold medal to the operator making and exhibiting the three most artistic photographs, size to be not less than 13 or more than 22 inches in length.

Class H.—One silver medal to the retoucher for the best set of six retouched negatives with prints from unretouched and retouched negatives.

Class I.—One silver medal to the printer for the most artistic printing, six prints to be exhibited.

Pictures exhibited by employees cannot be used from negatives from which employers exhibit.

Class J.—One silver medal for the best improvement in photographic appliances introduced since the last convention.

Class K.—Three prizes to be awarded for the best foreign exhibit of portrait photography, framed or unframed, delivered to the association free from all charges.

Exhibits in this class will be admitted to the United States free by sending the same directed to W. A. Davis, Secretary of the Photographers' Association of America, Buffalo Park Association, Buffalo, N. Y., U. S. A.

A diploma will be awarded for the most tastefully arranged exhibit.

Competitors for the Grand Prize or Class A cannot enter in Classes B or C.

Competitors in all classes except Class K must be members residing in the United States or Canada.

Applications for space must be made to S. L. Stein, 310 State St., Milwaukee, Wis., who will forward blanks for entries and also send the number under which the exhibit is to be displayed.

The exhibitor must attach this number to his exhibit.

Entries to close on Saturday, June 20th, 1891.

No space to be allowed after that time for exhibits.

All exhibits must be shipped so as to reach the exhibition building on July 8th, the Wednesday preceding the opening of the Convention, and all charges MUST be prepaid.

Exhibitors' pictures are to be known to the judges by number only. No name to be upon the pictures until after the awards are made.

The Executive Committee, who will appoint the judges, will hand in their reports on or before the afternoon of the third day, to the president.

Should any exhibitor influence in any way, directly or indirectly, the judges during their term of office, in favor of any exhibit, it shall be the duty of the judges to strike their exhibit or exhibits from the lists.

RULES GOVERNING THE JUDGES IN THE GRAND PRIZE.

The points to be considered are: 1st, Historic; 2d, Originality; 3d, Composition; 4th, Lighting; 5th, Technique.

Ten marks to be the highest for any one point, consequently 50 marks the most that can be given for any one picture.

The standard for this award must be 35 marks out of a possible 50.

RULES GOVERNING THE JUDGES IN CLASS A.

The points to be considered are: 1st, Originality; 2d, Composition; 3d, Lighting; 4th, Technique.

Ten marks to be the highest for any one point, consequently 40 marks the most that can be given to any one picture.

RULES GOVERNING THE JUDGES IN OTHER CLASSES.

The points to be considered are: 1st, Lighting; 2d, Posing; 3d, Chemical Effect; 4th, General Effects or Finish.

All photographs exhibited must be from negatives made since the 11th Annual Convention, held at Washington, D. C., August, 1890.

All art exhibits must be sent to S. L. Stein, Art Department, Photographers' Association of America, care of Buffalo Park Association, Buffalo, N. Y., all charges prepaid.

Exhibits for the stock department to be shipped in care of W. A. Davis, Secretary Photographers' Association of America, care of Buffalo Park Association, Buffalo, N. Y., and placed in position by 10 A. M., July 14th, all charges prepaid.

The art and stock department will be closed each day from 10 o'clock A. M. to 12 o'clock M., to secure a large attendance at the business meetings.

As will be seen from above notes, there has been a very liberal classification of art productions and awards for same, and it is hoped and expected that there will be a ready response, so that long before the Convention opens a knowledge of what is to come will enable the officers to be fully prepared for all entries, that each one may be properly classified and hung.

It is requested that all exhibitors send with their work screw eyes and cord, so that the committee may not be put to trouble and expense, as it is the plan to have all exhibits hung before the opening of the Convention, thereby saving noise and time, and having all members in attendance at the business sessions. It is very natural for all to postpone sending exhibits until within a few days of the Exhibition; but arrangements will be made at the railroad stations in Buffalo to hold anything sent until the proper time to send them to the hall, so that no one need feel any uncertainty about the safety or disposition of the same.

Have your box covers screwed instead of nailed; put your home address on under side of box cover for return of pictures; help your committee all you can by promptly forwarding entries and exhibits. There is enough for them to do, even if these rules and suggestions are fully carried out.

The Executive Committee are very desirous of having this Convention the best ever held, and earnestly request that every one will make an extra effort to have a finer display of artistic photographs than has been exhibited in the past.

Dead Black.—The best plan is to stain the woodwork of the camera as follows: Clean the woodwork carefully with glass-paper. Then rub over it a tuft of cotton wool, dipped in an infusion of nut-galls, and allow it to dry. Now go over it again with a clean piece of cotton wool, dipped in muriated tincture of iron. The great advantage of this method is that when once done there is no fear of it wearing off and the black settling on the plate or lens. But if you prefer it you can use the following:

Alcohol	8 ozs.
Lampblack	2 "
Gum shellac	1 "

Dissolve the shellac in seven-eighths of the spirit, and mix well the lampblack with the other ounce. Then mix the two.—*Photography.*

THE LATEST USE OF PHOTOGRAPHY.

MULTITUDINOUS as are the practical applications of photography, yet hardly a day passes but some new use or application is heralded in the daily press. So great is this range that it gravitates all the way from the discovery of celestial phenomena millions of miles from the earth down to the designing adventuress in Chicago who had her love letters photographed for use in a breach-of-promise suit, for fear that the originals might be written in unstable ink. The latest announcement now comes from Germany, and the scheme will without doubt be improved upon in the future.

The opening scene is laid in a railway train running from Stettin to Berlin. Among the passengers was a young man, Isidore Grünschnabel, the only son of a wealthy clothing dealer in the former city, who, in addition to his extensive business, prided himself upon being a "Geheimer-geheim commercien rath" of his native town.

The young man was on his way to the imperial city with a well-filled wallet, nominally to secure some job lots for his father's establishment. But in reality, as it afterwards turned out, his main object was to inspect the pachyderm existing in Berlin, in addition to coating the city upon the Spree with a hue, alongside of which even the safest photographic ruby would appear pale and sickly.

On the train this verdant scion of an old but commercial house became acquainted with a fellow-traveler,—one Fritz Schnepperle,—who was by birth a Berliner, by occupation a traveling "commis," or salesman, and, like many of his class, a sharper, always open for snaps. During the journey the young Grünschnabel made a confidant of his new-found friend, which culminated by asking him to act as his guide through the intricate mazes of the metropolis of the Hohenzollern. Well and attentively did Schnepperle listen, and acceded to his friend's request without much urging.

On their arrival in Berlin the young Stettiner, under the guidance of his new-found friend, devoted himself so assiduously to his study in zoölogy, and the task in which cinnabar supplied the monotone, that ere twenty-four hours had rolled around young Grünschnabel was confined to his room at the hotel with a pronounced attack of "Katzenjammer."

The patient reader will no doubt ask, What has all this to do with photography? A little patience, and the dénouement will bring the answer.

The designing companion, Schnepperle, after leaving his young companion helpless in bed, now sent a telegram to Grünschnabel Sr., stating that he had run across some large job lots, but was short 500 marks cash, which he wanted sent by return mail without delay, signing the name of Grünschnabel Jr.

The father, who is also an honorary member of the "Photographische Sonntagsjager," at once sent the money to the designated postal station in Berlin; but, with a latent suspicion that perhaps all was not right, he mailed at the same time a letter to the official at the station, enclosing a photograph of his son, and requesting that the money letter be delivered only to the original of the enclosed photograph. This letter he signed as "Herr Ober Geheimer-geheim Commercien Rath."

The following day the personator called at the station for the letter. The official, Herr Spührnase who entered into the spirit of the matter, compared the person with the photograph. A glance was sufficient, and the ever-present "Polizei-diener" was at once called into requisition.

On the following day the prisoner was arraigned before the Imperial Schwur Gericht, and, on being confronted with the evidence and photograph, was found guilty of attempted swindle, and sentenced to a term of six years at hard labor in the penitentiary at Spandau.

During the course of the trial the Judge, Herr Von Bürstenbinder, took occasion to pay a high tribute to photography, and the great aid which it lent to the police department in detecting criminals and assisting in the administration of justice. In the present case, the honorable judge stated that photography had proven itself capable of even a higher scope, viz., as an agent to prevent the successful accomplishment of a well-laid scheme to fraudulently obtain a sum of money. After congratulating the postal official upon his vigilance, the Judge stated that he hoped to see the day when photography would be regularly used in connection with identification in financial transactions; further, that here opened a field which so far had been overlooked in the past; also that he personally would request the "Photographische Verein zu Berlin" to formulate a practical scheme for the purpose, and bring the matter before the Imperial Chancellor for adoption throughout the length and breadth of the German realm.—J. F. S.

Liquid Glue.—A good liquid glue, always ready for use, is made by filling a small jar with glue of good quality, broken up fine, and then filled with acetic acid. Keep the jar in a vessel of hot water for a few hours until the glue is all melted. It is always ready for use.—*The Photographic News.*

PHOTOGRAPHY IN COLORS.[1]

EXPERIMENTS OF M. LIPPMANN.

ONE of our most distinguished physicists, M. Gabriel Lippmann, Member of the Institute and Professor in the Faculty of Sciences, has accomplished a memorable experiment in photographing the solar spectrum. At the meeting of the Academy of Sciences M. Lippmann presented to his colleagues several photographs of the solar spectrum, with the colors fixed upon the sensitized plate with their exact shadings and brilliancy. The learned physicist, to obtain such a remarkable result, did not employ any particularly susceptible chemical substance to preserve or to reproduce the tint of the objects. He simply had recourse to physical proceedings based on theoretical considerations most ingenious and of the highest order. M. Lippmann very willingly showed us, in his laboratory at Sorbonne, the result of his experiments and the disposition of the apparatus that he had arranged. Through his kindness and his explicit explanations we hope that we will be able to make the nature of his experiments thoroughly understood by our readers. Our Fig. 1 shows the apparatus used by M. Lippmann to obtain a photograph in colors. The sensitive plate G (Fig. 1, No. 1) is prepared in a very peculiar manner. It is necessary that the sensitized layer, whatever the chemical nature of it may be,—gelatine bromide of silver (the iodide and bromide of silver give good results), for example,—should be

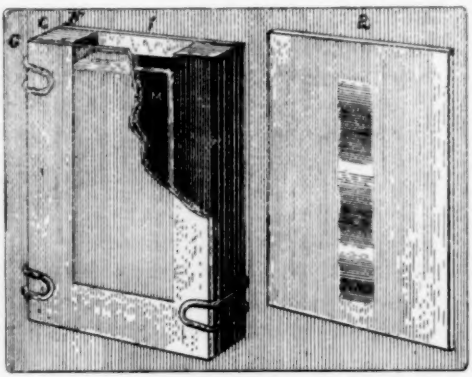


Fig 1

[1] A free translation from *La Nature*, February 14, 1891, by Mr. John W. Gibbonery.

very thin and transparent. It is also necessary that there should be no discontinuance in the sensitive film, and that it should not be presented in the form of grains, as in the ordinary emulsions. (The commercial emulsions contain bromide of silver in grains visible under the microscope and several thousandths of a millimeter in diameter.) The sensitized layer should be simply opalescent, and not creamy. The glass thus prepared is placed against a layer of mercury, the sensitized face coming into contact with the liquid metal. which is destined to form a reflecting surface.

In the photograph (Fig. 1, No. 1) the sensitized plate is represented by G. It rests against a piece of hard rubber (C) in the form of a U. A glass (F) closes the other side, and thus forms an enclosure for the mercury, as in a vase. These two pieces of glass (F and G) are retained in place by springs so that the mercury will not escape. The apparatus being thus prepared, we throw upon the outer surface of the sensitized plate a picture of the solar spectrum. After a long exposure, varying from fifty minutes to two hours, or until the red rays have sufficiently acted upon the sensitized film, the impression is completed. The development and fixing are done in the ordinary manner. The plate thus developed and dried gives the solar spectrum with its seven colors: violet, indigo, blue, green, yellow, orange, red (Fig. 1, No. 2). Seen by transmitted light the plate is a negative,—that is to say, each color is replaced by its complementary, the green by the red, red by green, etc. It will be noticed that the operation is one of astonishing simplicity. What has occurred in this experiment, and how do we explain the result? M. Lippmann finds the theory of his method in the principle of interferences and the coloring of thin sheets. The mercury forms a mirror before the sensitive film, and throws back the rays of light upon themselves. There is then a conflict, or as physicists say, an interference between the incidental and the reflected ray.

There follows in the interior of the sensitive layer a series of positions of interference,—that is to say, of luminous maximum and obscure minimum positions. The film is acted upon only at the minimum positions, and their place is marked by a deposit of silver. The result is that the sensitive layer, after the photographical oper-

ations are completed, is subdivided by the deposit of silver into a series of thin sheets. These sheets are precisely of the thickness necessary to produce by reflection the incidental color which gave them birth. The colors thus produced are, then, of the same nature as those observed in the films of soap-bubbles. The number of these thin sheets varies according to the nature of the luminous ray; supposing that the sensitized film has thickness of 1-20th mm., the yellow light will form 200 within the sheet, the violet 250, the red only 156, and the intermediate positions have their intermediate colors. The thickness of these layers is 0 mm. 00020 for the violet, 0 mm. 00025 for the yellow, and 0 mm. 00030 for the red.

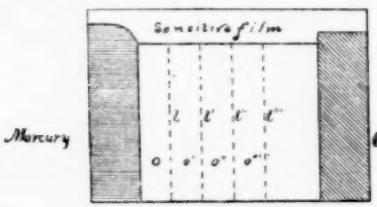


Fig. 2.

The illustration above given in Fig. 2, in which the sensitive film is considerably magnified, will assist the explanation of the phenomenon. Near the mercury on the first layer of the sensitized film there is a destruction of movement or obscurity as at 0. Further on, on the contrary, in 1 these two movements unite. There is here a maximum of light. Still further on there is again a destruction of light, obscurity in 0′. Further on in 1′ another maximum, and so on. In a word, the luminous vibration has marked photographically its trace on the film. It is simply to be reproduced later on, as are the sonorous vibrations in the phonograph.

We see that in these first experiments of M. Lippmann there is only involved the reproduction of the solar spectrum. The result obtained is considerable, but we have not come as yet, as we had at first believed, to the reproduction of pictures. The substance (film) which we have made use of is very imperfect. It is only truly sensitive to the violet luminous rays, less impressionable by the green, almost absolutely insensitive to the action of the yellow rays, and also to the red ones. It is because of this fact that so long an exposure is necessary in photographing the spectrum. This inconvenience is less grave when immovable objects

are in question, as in pictures of landscapes. M. Lippmann is now extending his researches in this direction. However, we can see that to find a complete solution of this problem we must find a substance which is as impressionable as the gelatine bromide of silver, and which is also influenced by all the luminous rays from the violet to the red. The way so brilliantly opened by M. Lippmann must lead to important work, and the first results of the discoverer, which we are happy to be able to present here, assure a brilliant future to the art of photography in color.

OUR FRONTISPIECE.

"**Spring Flowers.**"—We present our readers for this month with a charming child-study by H. Parker Rolfe, of Philadelphia. As will be seen, it is not a studio picture: For this illustration we use a series of four different negatives, all of the same subject, of equal excellence. Mr. Rolfe names the pictures, respectively, "Called Back," "Investigation," "Expectation," and "Admiration."

"**A Ramble in the Chester Valley.**"—Our extra illustration. The questions are frequently asked: What is the best size negatives for book illustrations? How can I use my 4x5 negatives for illustrations?—they are too small for one on a page, and too large for two on a page. Our illustration, we think, fully solves this problem. The negatives used in this picture were one 5x7, three 4x5, and four 3¼x4¼, and as will be seen, the result is a picture showing the main features of all the negatives, besides giving a much more comprehensive picture at, say, one-sixth the price of engraving them separately. The plan pursued was first to settle on the size of the block (4¼x5¾); then a paper was cut four times that size; this was then reduced in exact proportion until the smallest size was reached which would take in the eight negatives,—the object being to have as little reduction as possible; the prints were then carefully cut out and mounted on a plain white card so that there was no overlapping. When dry the white lines were drawn with ordinary water-color, and the process-block made in the usual way. The negatives, as well as the work, "Devon and Its Historical Surroundings," from which the cut is taken, are the work of the editor of this journal. The reproduction was made by the Philadelphia Photo. Engraving Co., and for softness of tint and clearness of detail is difficult to surpass.

PHOTOGRAPHY IN THE COLORS OF NATURE.

BY F. E. IVES.

(*Continued from page 116.*)

There are two ways of making the heliochromic pictures from these negatives. The first method does not produce a permanent picture, but a screen projection.

Lantern slides made from the heliochromic negatives and exactly reversing their light and shade must also represent the effect of the object upon the respective color sensations. One lantern positive, when seen by transparency in red light, reproduces the effect of the object upon the primary red sensation. Another, viewed in the same manner by green light, reproduces the effect of the object upon the green sensation. The third, viewed by blue-violet light, reproduces the effect upon the blue sensation. Evidently the combination of these three images into one must form a reproduction of the object as seen by the eye, correct in form, color, and light and shade. Such a combination is effected by projecting the three pictures with a triple optical lantern, so that they exactly coincide upon the screen. The result is what we have been led to expect.

We have here a true solution of the problem of reproducing the colors of nature in a screen picture, dating from November, 1888. Previous to the publication of my new principle, it was assumed by Cros, Poirée, and others, that if the projection method were employed, each picture should be projected by the same kind of rays as those which acted to produce it. In my method, as I have already stated, a picture made by the joint action of red, orange, yellow, and yellow-green rays, but chiefly by orange, instead of being projected by a similar mixture of spectrum rays, is projected by red rays only. Similarly, the picture made by orange, yellow, green, and green-blue rays is projected by green rays only, and that made by blue-green, blue, and violet rays by blue-violet rays only. That is the true principle, yet nothing of the kind had ever been suggested. The process is capable of

giving results which are above criticism, except of that hair-splitting kind which applies also to the ordinary photographic process as a means of reproducing objects which have no color. The most serious objection to this method of solving the problem is that its only commercial value would lie in its application to the illustration of popular lectures.

Dr. Stolze, who was one of the first to recognize the genuineness of this solution of the problem, doubted if, even in theory, color prints from the same kind of negatives could be made to furnish such a perfect solution. A year ago I also believed that there were theoretical difficulties in the way of realizing a perfect process with color prints. Only recently have I succeeded in showing what relation the colors of the prints must bear to the colors of light used in projection, in order to perform exactly the same function and, under like conditions of illumination, secure equally perfect fulfillment of theoretical requirements.

In the projecting method we build up the luminous image by adding light to light. White light is produced by the mixture of the three colored lights used for projection, and black by their suppression. But when we carry out the process to produce permanent pictures, the paper which may form the basis of the picture is itself white, and it is the shadows that are built up by the superposition of color prints.

Nevertheless, the color print has exactly the same functions to perform as the lantern positive, *i. e.*, to absorb and suppress, by its shading, light affecting one primary color sensation. If we remove our three positives from the lantern, the screen is evenly illuminated with white light. If we then replace the one representing the green sensation, its shadows will absorb the green light, with the result that the screen bears a picture in the complementary color, pink, on a white ground. In the color-print method we commence with a white surface, which corresponds to the fully illuminated screen, and the shadows of the color print representing the green sensation, when laid upon this surface, absorb the same kind of rays as the shadows of the positive in the lantern, and with the same result, a pink monochrome picture on a white ground. Superposing the other two color prints upon

the first one on paper is like inserting the other two positives in the lantern. This explains why the primary sensations are represented by prints having shades of the complementary (absorbing) color. It is the lights and not the shades of the color prints that represent the effect upon the respective primary color sensation. It is only necessary to use dyes that completely absorb red light but neither green nor blue violet for the print representing the green sensation, green but neither red nor blue-violet for the green sensation, blue-violet but neither red nor green for the blue sensation, in order to obtain from my negatives a color-print heliochrome that exactly fulfills all theoretical requirements, provided that it be examined in the same kind of white light that we obtain in the screen projections, by mixing red, green, and blue-violet rays. The dyes mentioned by me in my paper of Nov. 21, 1888 (Prussian-blue, aniline-magenta, and aniline-yellow), fulfill this requirement, and color-print heliochromes made therewith according to my instructions must, therefore, reproduce all the colors of nature under the conditions of illumination just stated.

We have, then, a theoretically perfect and, at the same time, practicable process of reproducing all the colors of nature in permanent prints from three negatives.

In order to obtain colors that would appear of exactly the right kind and shade in ordinary white light, it would be necessary to use dyes each of which completely absorbed all light affecting the color sensation which it represented, but no other. The colors would then be correct in ordinary white light, but would appear too dark, relatively to the white ground. In order to obtain colors that appear brighter in ordinary white light, dyes may be used which completely absorb only rays that excite chiefly single primary sensations and other rays in due proportion. The dyes proposed by me fulfill this requirement, so that even in ordinary white light the degradation of a color is insignificant, except in the greens, where it is noticeable.

I have seen some of the results produced by the older processes of composite heliochromy, and others who have also seen them will, I am sure, bear me out when I say that the colors have invariably been not only untrue, but either very dull or else flat

and patchy and wanting in the delicate details and gradations of light and shade which characterize good monachrome photographs. All that showed bright colors resembled nothing so much as cheap chromos. In the composite heliochomes by my process, which I show to-night, the colors are, as you can see, as perfect in detail and graduation as the monochrome shades of an ordinary photograph.

Now, there really is such a thing as photochromy, which is carried out on the same plan as chromo-lithography, but it is no more like composite heliochromy than the Morse system of telegraphy is like telephony. In photochromy it is only necessary for the photographer to make one negative of the object to be reproduced, and this negative contains a register of form and light and shade only. Composite heliochromy cannot be carried out with less than three negatives, which must contain a register not only of form and light and shade, but of color also. In photochromy an artist is employed to regulate the distribution of colors, according to his taste or judgment; in composite heliochromy it is the light itself which regulates their distribution and combination, automatieally, according to fixed and true scientific principles. Photochromy is an art; composite heliochromy, a science.

There are others who do make a distinction between photochromy and composite heliochromy, but whose statements are nevertheless too misleading to have any value. Only a few months ago there appeared in one of the oldest and most pretentious of the photographic journals an editorial article upon this subject, in which reference was made to "the three primary colors, red, yellow, and blue," and all advance made upon the basis of true theory was discredited. Another, writing for an important periodical, said, "the red, yellow, and blue" theory worked well enough in practice, and classed as an "advanced worker" one who had never got beyond that idea in composite heliochromy, or even contributed anything to its development. Dr. H. W. Vogel, taking advantage of the prevailing ignorance, even tried to make his readers believe that I had claimed as my own something which belonged to him.

The frequency of such misrepresentation by writers from whom the public has a right to expect something very different, is my justification for assuming the office of teacher and historian long enough to state the facts, which many people have wished to know, but could not discover by reference to current photographic literature.

In conclusion, for the benefit of those who would like to know why this process is not now in commercial operation, having been perfected in theory three years ago, I will say that, for various reasons, it is not practically available to one whose time is nearly all taken up with a business of a different character, and I do not expect to do much with it until I shall have completed preparations which will justify me in making it my chief occupation. In order to carry out the process in strict accordance with the theoretical requirements, means must be employed not only to secure three negatives and three prints, each of which is correct by itself, but each must bear also a certain definite relation to the others. A very little over- or under-exposure of any one color print, or a very little too much or too little of the color stuff in the film, will change the shade of delicate colors. Fortunately, there is a simple optical test by which such a defect can be detected without reference to, or knowledge of, the colors of the object photographed; but at present it is difficult to secure such harmony of parts when but little time can be spared to devote to the operation of the process.

Composite heliochromy must always remain a comparatively costly process when carried out in a manner calculated to yield the finest results, and can most profitably be brought before the public in the form of optical lantern lecture illustrations, not with the triple lantern, but with transparent color-print heliochromes mounted as lantern slides. If the color prints are made by the Woodburytype process, such heliochromic lantern slides, infinitely superior to hand-painted ones, can be made in quantity at a cost not exceeding one dollar each.

Correction.—The formula for dry plates on page 109 should read: iodide of potassium, . . . 0.40 c.

Tinted Silver Prints.—An entirely new method of producing colored silver prints, giving extraordinary results and effects, is published by Ogonowski in his book upon photochromy. The proceeding is as follows: Ordinary plain salted photographic paper is floated on the silver bath as usual, and printed faintly under the negative; it is then washed, toned, and fixed. This faint positive print while still wet is laid upon a sheet of absorbent paper; then both are placed upon a sheet of glass. The damp print, from which all superfluous water has been absorbed, is now worked in with water-colors, using only local tones, avoiding the use of flake white, vermilion, chrom and cadmium yellow. The print is now thoroughly dried; it is then albumenized one to three coats with salted, whipped albumen. It is then again silvered, and again placed under the negative, taking great care that the register be true. The print is now made similar to an ordinary albumen print, washed, toned, and fixed. The tints, being protected by the coating of the albumen film, are not affected by the various processes. These tinted silver prints are said to produce the most charming effects.—*J. F. S., from Photographisches Wochenblatt.*

RECENT PATENTS.

THE following list of patents relating to the photographic interests is specially reported by Franklin H. Hough, No. 925 F. Street, N. W., Washington, D. C.

ISSUE OF MARCH 3D, 1891.

447,645—Solar Reflecting Camera; R. N. Reed, Covington, Ky.

ISSUE OF MARCH 17TH, 1891.

448,447—Photographic Copying Apparatus; S. C. Madsen, Sleepy Eye Lake, Minn.

448,364—Photographic Film; V. Planchon, Boulogne, France.

448,383—Photographic-Plate Washing Apparatus; T. W. Taylor.

ISSUE OF MARCH, 24TH, 1891.

448,801—Photographic Roll-Holder; H. G. Ramsperger, New York, N. Y.

In the Twilight Hour.

THOU knowest all the heart pangs,
The secret pains within;
The longing for a purer life,
The Sabbath rest from sin.
Thou knowest all the anguish
Breathed in each stifled moan,
The cup of sorrow's bitterness
The soul must drain alone.

Thou knowest why the heartstrings
Wait for some master hand,
Whose slightest touch the passing breath
Would fully understand,
And make responsive melody
Where now but broken chords
Sweep thro' the deeps, like a requiem
O'er Norway's wild fiords.

Thou knowest why the sensitive plate,
In the spirit's camera set,
Receives each impress like a flash
Of mystic light, and yet
The reverse image is obscure,
Its form does not appear
Until the bath of tears brings forth,
Thro' darkness, outlines clear.

Thou knowest why the soul was filled
With ideals to be crushed,—
Why forms so bright, at touch of clay,
Should crumble into dust;
Why such bright visions, shrined within,
Should vanish at a word
From those who angel whisperings
Mayhaps have never heard.

Thou knowest what blossoms need the sun
What flowers bloom in the shade;
What lives develop best in gloom,
Where other lives would fade.
Thou knowest! Ah! what other thought
Can bring the soul such bliss
Amid the labyrinthine path
Of life so strange as this?

And some time thro' the gloom and pain,
The sad, discordant jars,
The imaged brightness soon effaced,
Wilt Thou unto Thy stars
Recall our restless, 'prisoned souls,—
Recall them to their own,
To rest, while Thou art teaching them
To know what Thou hast known?

—*Eva Gorton Taylor.*

IT is truth, not opinion, which is of supreme concernment.—*R. West.*

TAKE up one by one the plain, practical duties that lie closest to your hand, and perform them as fast as you can.

A CHILD is a veritable Athenian, always desiring to hear something new. As he matures he carries this need on and up with him, and he who would be a teacher must know this fact and feed this desire.—*H. C. McCook.*

EVERY question asked by a child's mind is reaching out towards the soul of things, and every question rightly answered and every law understood stimulates the growth of the child's mind towards the world that lies around it.—*M. B. Pecke.*

THE grass withers and the flower fades, but beneath the brown spears and the dead stems the elemental forces, tireless and resistless in their potent activity, wait in readiness to build and weave the innumerable summers to be.—*J. L. R.*

GREEDY, selfish, coarse, ambitious souls are seldom thankful. The quality of being thankful indicates a fine nature. If you bind on to the anchor a cable as big as a man's arm it answers a good purpose in a storm, but if you want a musical response its coarse fibre is a poor chord to play on. —*H. W. Beecher.*

NO crowned head is higher than his who has been wise, patient, industrious, and temperate, and having gathered wealth uses it for God's glory and the good of men. The flings of envious poverty at such a man are the smiting of poverty's own self.—*H. W. Beecher.*

Queries and Answers.

Moses Schatophskey, Bowery, N. Y.—The cabinet you submit is no doubt a good picture of the original. The photographer who took you could not develop any more character in your expression than there was in the original. Where there is a lack of tone in the sitter, the artist usually supplies the polish in the final manipulation, viz-with the burnisher.

Augustus de Rhinebilt, New York.—The report you mention—that one of the signers to the late memorial to the Academy of Fine Arts in Philadelphia, who is an amateur photographer, encases the limbs of her tripod with a flannel skirt when she takes an outing with her camera—is a base fabrication and slander. To our own knowledge, since the crusade commenced the lady in question has only used a hand camera.

Anxious Parent, Quakertown, Pa.—Your question as to the best accelerator for a young amateur photographer, who haunts your home and seems never to know when going-home time comes has been received. In reply we will state that overtiming is a common fault with young amateur photographers, especially when there is a young woman in the case. Our advice would be that you give him a hint to shorten his time or he will hopelessly fog his plate. If he does not take the hint, tell him to "cap" and retire; if this has no effect, you have the usual remedy of sole leather.

Washington Smith, Kanackee, Ill.—You neglect to state what kind of blisters you allude to. If they are on your feet, hands, or body, and are troublesome, better consult a good physician. If you mean blisters on plates or prints, subscribe to the AMERICAN JOURNAL OF PHOTOGRAPHY, read it carefully, and keep posted. In our bound volumes you can find remedies for all photographic troubles.

Ogontz.—Starch, well boiled and strained, is the simplest, best, and most convenient mountant.

Sciopticon.—We always use a headlight oil of 175° fire test. It gives the best results to be obtained with an oil lantern.

Manual Training School.—We do not know where you can obtain a set of patterns to make a hand-camera. Better save your money and time by buying any recognized make on the market.

WE reproduce in grains the formula for dry plates as given in our March number, pp. 109, 110, at the request of a number of correspondents, viz.:

Bromide of potassium	½ dr.
Iodide of potassium	6 gr.
Gelatine (winterthur)	15 gr.
Water	2 oz.
Nitrate of silver	2½ dr.
Water	3 oz.
Gelatine	3¾ dr.
Water	6 oz.

Tripod, Patterson, N. J.—We know nothing of the concern you inquire about. Our advice is to apply to any reputable dealers in photographic goods. A good outfit is always the cheapest in the end. You pay for it only once,—*i. e.*, when you buy it. A poor camera is dear at any price. If there is no photographic stock house in your city consult, our advertising columns and you will not go wrong.

Chautauqua Student.—The lens you mention will answer your purpose. Write direct to the publishers of this journal.

Constant Reader.—Refer to our last volume. Your signature is hardly justified by your question.

Literary and Business Notes.

WE regret to announce the demise of our young contemporary, *The Photographic Globe*, after the short existence of a year. Thus another photographic light has flickered out. In connection with this subject, we wish to extend to the late editor, Maximilian Foch, our sincerest sympathy in his illness, and trust that the proposed sojourn in a warmer clime may recuperate him so that he may soon reënter the journalistic field.

PAINTING IN OIL. M. Louise McLaughlin. Second thousand. Robert Clarke & Co., Cincinnati.

Announced in our last JOURNAL. A thoroughly practical and exhaustive work upon the subject. The technique, harmony of color, its relation to light and shade, materials, the changes caused by the mixture of pigments, are all subjects treated upon. The little volume forms a manual which should be in the hands of all young artists and students. It is well printed and attractively gotten up. We congratulate the fair author on her success.

A WOMAN'S TRIP TO ALASKA. By Septima M. Collis (Mrs. General Collis). Cassell Publishing Company, 104-106 Fourth Avenue, New York. Received with the compliments of the Eastman Company.

A superbly gotten up volume of almost two hundred pages, printed on heavy enameled paper and profousely illustrated. As indicated upon the title, it is a woman's narrative of her trip through the inland seas of the Sitkan Archipelago. The work is well written, and describes the "voyage" in detail, and explains how the delightful excursion was made without fatigue or discomfort, and last but not least, at a trifling expense. One of the main features of this work are the illustrations, the majority from negatives by the fair traveler, who was accompanied by her faithful companion, a Kodak. Many of these scenes are faithfully reproduced in half-tones, a number being printed in different colors, making a pleasing effect. As another evidence of what a great factor photographic reproduction has become in the art world, it is but necessary for us to mention that the half-tones are by the American Bank-Note Company, of New York, a corporation which until a short time ago confined itself, if we mistake not, exclusively to the finest steel engravings.

GESCHICHTE DER PHOTOGRAPHIE VON C. SCHIENDL. Wein, A. Hartleben.

A thorough and comprehensive history, of almost 400 pages, giving a complete summary of the history of photography from the earliest days to the present time. It is embellished with a two-page frontispiece of the "Discoverers and Founders of Photography." In this picture Petzwal and N. Niépce form the centre medallions, around which are grouped as lesser lights Fox Talbot, Niepce de St. Victor, Daguerré, Robinson, Carey Lea, Davanne, Poitevin, Albert, Mungo Ponton, W. de W. Abney, and M. A. Gaudin.

In his prospectus the learned author states: "With the exception of an English history of photography, which is very concise, and has a specific national character, so far there exists no exhaustive work which presents this epoch-forming discovery in an exhaustive and comprehensive manner. The work here presented to the reading public solves this problem thoroughly, with great minuteness and praiseworthy impartiality. It will prove a monitor for such as wish to inform themselves about the origin of our art, as well as the rapid strides, in which the most celebrated scientists of the century have taken an active part,—wherein often the uncompleted labor of one was surpassed by one of his co-workers, so that numberless counter claims for priority have arisen,—all of which, however, have been here moulded into a complete, circumspect narrative. The volume will, it is trusted, satisfy all who practice photography for love of the art and in the interest of scientific research."

All of the various processes—recent as well as old—are treated in detail. At the same time, within the maze of history, science, processes, and research, the artistic part of photography is not forgotten.